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THE BATTLE-SHIP OF THE FUTURE.

BY ADMIRAL P. H. COLOMB, ROYAL NAVY.

IT IS not an easy task, within the compass of an article, to forecast the resultants of the forces now at work amongst the navies of the world in the production of the warships of the future. We can only proceed somewhat as the mathematician proceeds when he constructs a curve from the data of some of its loci, or extends it on the basis of an early part of the curve which is in his hands. But just as the astronomer meets with disturbing causes in the trace of the orbit of a new planet, so must the interpreter of the course of naval development expect to meet disturbing causes in the forces of fashion, of sentiment, and of habit; to say nothing of the possibility that entirely new powers of propulsion, of offence, and of defence may arise to break up the whole calculation.

THE POWER OF FASHION, SENTIMENT AND HABIT.

But without going into the consideration of such new elements, history and experience must teach us that the power of fashion over the warships is somewhat analogous to its sway over the form and color of a lady's dress. A long war will—to use a common expression—knock fashion out of time; but during a long peace her influence is great over the designs of the warships. Scarcely any navy produces its designs of warships with a single eye to their functions. They are often much more strongly governed by the desire of imitating or surpassing some other designs; and we are as much ashamed of appearing before the world with old-fashioned designs of warships as a lady is of going to church in an old-fashioned bonnet.

In another way, ostensibly utilitarian, but really sentimental, beliefs affect the characters of warships. Isolated experiments or occurrences detached from their environment create strong impressions on the public or on the naval mind. The sentiment is allowed to run riot amongst material, and we get warships which outlive a little day of praise, but long hamper by their existence the rate of progress on more sober lines. The strictly logical and utilitarian view which ought to prevail is warped in directions which are only seen to be crooked after long perseverance in following up the sentimental idea.

The force of habit, again, often prevents the full appreciation of a change which has been introduced ; and we go on with constructions, or modifications of constructions, whose *raison d'être* has long passed away. Habit prevails, too, in putting incongruous things together to an extent which really interferes with the new design and hides its purport. What was forced into the design of one type of ship will be passed into another type with which it has properly nothing to do, and, when it is there, reasons will be invented to keep it there which really have nothing to do with its introduction.

THE WARSHIP IN GENERAL.

In discussing the future of the warship, therefore, we must go on from experience of the past to an ideal future ; basing our forecast in the first place on the merits of the case, but admitting, while we do so, that the merits of the case will not always prevail ; or at least will be hindered—delayed by other unreasoning forces. We shall best succeed by analyzing the composition as, it were, of the modern warship in getting a general idea of the relative permanency and strength of her components. We may take the case under the three heads of speed, coal-endurance and sea keeping qualities, offensive and defensive powers.

We should understand of speed that, though we may not be able to fix its limits accurately, yet, as we approach them, the sacrifices entailed are so enormous that a practical limit is now reached. We ought to be clear on another point, namely, that equality of speed among different navies is the only possible goal we can make for. Not to be behind in speed should be the aim, only because to surpass in speed is impossible. In the war ship there is not now the guarantee for the nominal speed being realized which existed after copper sheathing was placed on the bottom of the sailing warship. All sorts of things happen in the engine-room under a pressed speed, which could only happen to the sailing warship in strong winds. At any critical moment the pressed steamship's speed may forsake her ; and it would appear from the general reason of the thing that a reliable moderate speed is more important to the warship in general than an excessive speed liable to collapse without warning. In any case I look to see copper sheathing again made universal, as avoiding that bugbear of Sir George Rooke's time—a foul bottom. If it can be successfully applied to one steel ship, it can be applied to all, and the nominal reduction of speed due to the increased displacement ought not to be considered in view of the stability given to speed by a clean bottom.

COAL-ENDURANCE, AND SEA-KEEPING QUALITIES.

It is clear that naval minds are everywhere hardening on the question of coal-endurance. We cannot broach the matter without remembering that the advent of liquid fuel may be close at hand, and as ships can be fuelled (to coin a verb) at sea with liquid fuel when it would be impossible to take in coal, the hastening of that advent is a thing to be calculated on. As it is, with coal, the experience of such ships as the "Amphion," with a nominal extreme speed of 17 knots and a nominal coal endurance of 11,000 miles at 10 knots, on a displacement of 4,300 tons, appears to give more satisfaction to the naval mind as a combination than the "Blenheim's" 21.6-knot speed with 15,000 miles coal-endurance on a displacement of 9,000 tons. An "Amphion" would not be justified in running away from a "Blenheim," so that the extra speed is not so far called for ; and while the nominal 4,000 miles greater coal-endurance may be an advantage, it would seem to be much more than balanced by the displacement of the "Blenheim." While, therefore, great stress must be laid on coal-endurance so long as coal is the fuel, it may be easy to overdo it in sacrificing other elements.

But coal-endurance is itself nominal. The "Amphion" could not, as a matter of fact, steam 11,000 miles at 10 knots, nor could the "Blenheim" steam 15,000 miles at the same speed. A great deal of coal is consumed which does not go in propulsion. The tendency is to examine these matters more closely, and there is a prospect that some fixed amount of coal-endurance will be roughly arrived at, which will form one of the bases of every design. It does not appear reasonable that coal-endurance should be proportioned to type as it generally is at present. Classes of ships likely to be associated in the same duties, as 1st, 2d and 3d class cruisers, ought and, it would seem, must ultimately rest upon a uniform coal-endurance, though it may not be so necessary to equalize the speeds. Battle-ships, acting always in concert, ought to be, and perhaps will be, equalized all round.

The copper sheathing already mentioned, as it makes speed more reliable, has a consequent value as an element of sea-keeping. The other elements are, of course, covered by the ideas of good sea boats, and good accommodation for officers and men, and these are things more and more considered.

OFFENSIVE AND DEFENSIVE POWERS.

The offensive powers of the warships at present reside in the gun, the torpedo, and the ram. To mention them in the order of their effective striking ranges, we see all round us that the gun has developed in a way that it never showed any signs of doing in the days of our forefathers. The mere growth in the size and power of the guns is nothing. Mere growth was indicated when the United States built the 24-pounder frigates in 1812, and the 68-pounder, the 8-inch and the 10-inch shell guns of thirty years ago were more recent and reasonable developments of inventive genius. What is remarkable is the astonishing incongruity of the arrangements that have grown up, the wonderful sway that has been exercised by fashion, sentiment, and habit, in establishing the gun, as it is established, in the modern battle-ships, and as it has been thence passed, to some extent, into the modern cruiser. The great point before us in this forecast is to estimate whether the existing type of battle-ships as represented to a greater extent, say, by the British "Royal Sovereign," and to a lesser extent by the French "Amiral Baudin," but to the greatest extent of all by such a ship as the British "Sans Pareil," or the ill-fated "Victoria," is suited to its purpose.

The guns of each ship are divided into three classes—the heavy battery, the medium battery, and what may be called the machine-gun battery. The "Royal Sovereign" carries four and the "Amiral Baudin" three monstrous cannon capable of penetrating the thickest armor that either ship bears at distances far beyond that at which any reasonable person would attempt to fire with hopes of hitting at all. There may be in either ship some little patches of armor a few feet square which guns of half the size and weight would not easily penetrate at any distance within which there could be hopes of hitting. But in the "Amiral Baudin," as opposed to the "Royal Sovereign," there is so little armor of any kind offered as a target that the least likely thing to happen in action is that a "Royal Sovereign" heavy projectile should strike the armor of the "Amiral Baudin," which however, the whole theory of the "Royal Sovereign" proclaims it designed to do. The greater part of the area of these ships offered as a target has no armor at all on it, and most of the fighting men are entirely open to destruction by the machine-gun battery of either ship. It may be said to be only quite recently that either France or England has begun to remember that, up to date, the proportion of killed and wounded has determined the victory. The "Royal Sovereign" offers some work to the medium battery of the "Amiral Baudin," as she carries a small area of five-inch armor, which is not pervious to the machine-gun battery. But, unquestionably, the general result has been to design two great battle-ships in order to carry a few enormous guns destined to penetrate armor which, in the end, is not offered to either side. If the "Royal Sovereign" and the "Amiral Baudin" should ever come to try conclusions, it is not at all unlikely that the heavy guns, firing slowly, and not more surely than the light ones, will be, as it were, by the way, and that the victory, if gained by the guns, will be gained by the medium and the machine-gun battery, not by the monstrous cannon whose presence alone justifies the design.

But if we look at the "Sans Pareil" we arrive at conclusions still more mathematically "absurd." Not only does the "Sans Pareil" boast herself in carrying two still more enormous guns to penetrate armor which never was and never will be offered to them, but she has assumed that, because she has these monstrous weapons, the enemy will obligingly keep himself in her front so that she may fire at him there, as she could not fire at him as long as he hung in her rear. But it is not possible for one ship to force another to keep a position ahead. The only compulsion possible for one ship to offer to another is—if she has the superior speed—to force her either to fight as in chase, or else not to fight at all. Thus we have, in the design of the modern battle-ship, a set of irreconcilable incongruities as far as her guns and their position in the ship are concerned. Are these incongruities permanent, the result of logical argument ? Or are they ephemeral, the result of the interference of fashion, sentiment, or habit ? How is it our forefathers never thought of such things ? The fact I believe to be that the modern battle-ship might well make answer like Topsy, and say, "Never had no mudder, tell 'ee. 'Spects I growed."

Our forefathers were very clear about the necessity for not multiplying types of guns in one ship. They knew all the practical difficulties that arose when the wrong ammunition was brought up to the right gun. They knew that in the end each ship would be found fighting her own class, and they did not attempt to overstep what war taught them, though they did not lose sight of what is supposed to be the modern idea of armoring ships ; they observed that the scantling of the ships formed a natural armor ; that the lower parts of a line-of-battle ship were impervious to all but the heaviest guns carried ; and that generally the thicker sides of the line-of-battle ship were impervious to the lighter guns of a frigate. But they knew that if the frigate should want to cover herself so as to fight the line-of-battle ship, she must greatly reduce the number of shot she fired in any given time, and thus the line-of-battle ship must preserve her superiority. This kind of argument kept the general type of the war-ship permanent after it had been once fixed.

When steam made its approaches it occupied, on the broadside, the greater part of the space required for guns by its paddle-wheels, and it thereby drove the guns forward and aft, and forcibly reduced the number possible to be carried. It was necessary to restore the balance, and the paddle-wheel steamer did it by introducing a heavier class of gun at bow and stern—the only thing she could do. But as far back as 1848 this enforced change made officers think that it would not be possible to give full effect to the old broadside position in action, and the idea of the "end-on" battle arose. Presently the paddle-wheel gave place to the screw, and restored the broadside to its position and power ; but we had got so accustomed to the heavy armament of bow and stern that, though there was no more argument in its favor than there had been a hundred years before, we put it into the screw ships by mere force of habit. About the same time came the building of a vast number of steam gunboats, designed to fire shell into the Russian strongholds in the Baltic. For this purpose nothing was better than to put about two heavy shell guns into each boat. The eye and the sense got accustomed to them and they hardened the idea of few heavy guns capable of pointing in many directions instead of that of many guns mounted in the old way on the broadside; we lost the sense of the fact that the manœuvring powers of steam removed, instead of increasing, the necessity for permitting the gun to cover large arcs of fire. We ought to have argued, that the easier it became to move the ship the less necessity there was for moving the gun in the ship. We argued and acted the other way exactly.

Presently came the armor-clad frigate, preserving all the characteristics of the wooden frigate, but raising at once the debatable question whether in view of the increasing power of the gun, armor was to be kept thin and extended in area, or made thick and reduced in area? Coles in England and Ericsson in the United States offered a solution which ran in the groove of fashion, of sentiment, and of habit. The turret-system exposed very little surface to armor; was capable of mounting the heaviest gun, and gave—at least in the "Monitor"—the most perfect all-round fire without need to remember that steam, and especially the rising twin screw, had done it already.

The dramatic incident of the "Monitor's" victory over the "Merrimac," alluded to by Mr. Secretary Herbert, which was in my mind the decisive battle of the Civil War, clinched the business. Coles claimed complete armor, all-round fire, the heaviest guns, and a power of concentrating all of them over a very large arc. There was an opposition here in England in what was called the box battery system, offering little power of concentration, but giving a possibility of a weak all-round fire, and a special strength in bow fire or in stern fire which Cole's latest designs had left—not at all improperly—excessively weak.

The set of ideas culminated in the "Thunderer" and "Devastation," two great turret ships, which depended wholly for their defence upon four immense guns in two turrets. They were scarcely built when it was seen that half a dozen gun boats, each carrying a heavy gun, or one or two torpedo boats, would prove quite a match, at one-tenth of the cost, for these giants as they then were. The necessity of an auxiliary armament was manifested and the newer designs began to contemplate it. Out of the jumble emerged the present type, which I do not think anyone really considers permanent.

It has become obvious in the first place that there is not and never was necessity for gigantic guns, which can only be mounted in turrets and barbettes. There is a general feeling of unrest in the face of ships costing a million and weighing 14,000 tons each. The sudden and awful loss of the "Victoria" has emphasized what had before been muttered, that there is a want of economy in putting too many eggs in one basket. The power, which improved powder and increased charges have put into the hands of the lighter guns, all seems to point to a time when the size of the guns, composing the heavy armament of the battle-ship, will diminish, as the size of the guns of the medium battery will increase. When the very heavy gun disappears there will be no more reason for keeping up the fiction of the "end-on" battle, and the moderate-sized gun in considerable numbers may be restored to its old and legitimate place on the broadside.

Even the sentiment which has commended the building of such incongruous cruisers as the "Dupuy de Lôme," "Blake" and "Blenheim," "Powerful" and "Terrible," ships which are nearly battle-ships, but not quite, seems likely to have its effect in the same direction. For these are broadside ships; a heavy bow and stern gun having been passed into them without reasoned justification by the force of habit. The discoveries of Mr. Harvey in the improved resisting power of armor plates, by enabling larger areas to be armored for the same weight and with the same resisting power as smaller areas were before, tend likewise to bring us back to the old broadside form. No one has yet tried to design a broadside battle-ship to carry moderate guns, unhampered by the troubles of masts and sails. When some one does, the enormous advantages are likely to be recognized, and once back to the broadside form we shall not be likely to stray from it again.

Tactically, I am assured there is no cause to magnify, or to particularly strengthen, bow fire. We might remove every heavy gun out of every cruiser without very much hurting her real strength. They do not want their power of penetration, and it is waste of ammunition to operate at long range. A weak fast ship, however, would be justified in strengthening her stern fire, because she can compel her enemy to fight her from behind, or to leave her alone. The tendencies point then, in my opinion, towards giving up the very heavy gun, by consequence the turret and barbette, by consequence the very large and very expensive battle-ship. I believe it will be generally conceded that neither the torpedo nor the ram has any dominating influence over the design of the warship. Speed, coal-endurance, sea-keeping qualities, and the gun, are the main bases of construction. The torpedo can be fitted in to suit the rest of the design, while the ram can be fitted to every ship without any reference to the features of her construction.

The gun, too, must dominate the tactics of naval war. If a commander chooses to confine himself to an artillery action, nothing but superior speed on the other side can bring the torpedo in. If a commander again chooses to fight a torpedo action, nothing but superior speed can bring the ram in. We are, therefore, justified in treating the gun as the governing factor of all design, and in believing that the future of the warship depends on the number and size of the guns which it is decided a ship should carry. Nothing could be more fallacious than to attribute to those who are opposed to the immense displacement now given to individual ships, the desire to fix a displacement and work to it. The displacement must suit the requirements, not the requirements the displacement. We must begin by reducing the size of the gun, and it is no use asking any one to combine 8,000 tons displacement with a 67-ton gun.

CLASSES OF SHIPS.

Passing now from considering the warship in general and her future, it becomes necessary before closing our inquiry to say something about the warship in particular, considered as designed for different strategical and tactical purposes. It has ever been the thought of times of peace to consider a navy as a congress of ships, beginning with glorious monstrosities, as "The Sovereign of the Seas," the "Santissima Trinidada," and the "Inflexible," and descending by regular gradations to the insignificant cutter or gunboat. It was peace thoughts which created in England the system of "rating," descending from the 1st to the 6th rate in the power and importance of the ship. It was the experience of war which enforced classification according to strategical and tactical needs. The Dutch wars invaded the rating system and forced a great division upon the fleet between the ships which were "fit" and the ships which were "not fit" "to be in line." Thus arose the precursor of the existing great division of a navy into "battle-ships" and "cruisers."

The function of the battle-ship is to act on the defensive, in concert, of the waters over which dominion is claimed. The battle-ship is the representative of a force waiting to be attacked and daring attack. If there is ever to come anything which is stronger, offensively and defensively, than the battle-ship, she must disappear. The theory on which she rests is that there is nothing but another battle-ship which is capable of offering her a fair match. She always has to secure herself against special attacks, and she cannot, like the Afrite, change herself into a pomegranate lest the Afrite on the other side might change herself into a fowl and swallow her seed by seed. The other day it was the unarmored gun-vessel which threatened her; she met it by adding her medium battery. Later she was to be swept off the seas by a swarm of torpedo boats; she met it by adding the machine-gun battery. At the moment it is suggested that rams pure and simple, small and swift, will be too much for her. She looks calmly down and would like to see them try. All such threats annoy her, but she sees clearly that whatever beats her must take her place. No special rams, no special torpedo boats, can take up and hold her defensive position; and if they caused her to disappear they themselves would follow, because it is only her existence, which justifies theirs. I believe, therefore, that the battle-ship, as a battle-ship, will hold her own to the end of time. The experience of war tended to bring her down to uniformity of type and to mean dimensions. I believe that the non-utilitarian views of peace will not be able to resist the teaching of experience.

The cruisers have more various duties to perform and must always be broken up into several classes. But the same causes which tend to uniformity and moderate dimensions in the battle-ship tend to produce the like effects on the three or four classes which are alone necessary, and were alone found necessary in former wars. There is no real place for cruisers which are nearly battle-ships unless they be used like our own "Blake," "Imperieuse" and "Warspite," as representing battle force on distant stations. Even here, argument emerges very doubtfully in their favor. Mr. Roosevelt has distinctly knocked away the crutches on which argument used to sustain itself in referring to United States policy in the War of 1812. The true cruiser policy is to arm them and protect them to fight their own class; to give them an abundant coal-endurance; a reliable speed and, by avoiding all attempts to impose heavy guns on them, to enable displacement to be kept down and numbers to be kept up. The largest and fastest class of cruisers would probably be those selected for acting as the eyes of the fleet. A smaller class stationed singly, or doubled and trebled, according to the well-known custom, would form the guards of commerce; while a still smaller class might keep close watch on the enemy's ports, interrupt his coasting trade and report progress to the battle-fleet.

Study of the exact conditions probable in naval war should for each nation direct its naval policy of design. I doubt altogether the wisdom of France and of Russia, if they prepare to cripple the commerce of England by means of a few very large and powerful cruisers, rather than by swarms of much smaller ones. The only way in which I can suppose them to win on such a policy would be by their inducing us to imitate them. If France and Russia have hopes of meeting on an equality the battle-fleets of England, they are no doubt well advised in maintaining battle-fleets larger than are necessary for securing their territorial waters against continental enemies; otherwise their policy should, in my opinion, be to develop the cruisers. I sometimes think that if the United States so willed it, she might become the mightiest naval power that the world has ever seen. Her situation and general policy would seem at present to lead her towards the control of the naval forces of those American States which might otherwise be possibly used to her detriment. Naval operations for her would thus be at great distances from the home base, and design might be expected to run in the direction of considerable offensive power and great coal-endurance, even at the expense of some nominal speed.

P. H. Colomb.